

Appl. No. : 09/851,261
Filed : May 8, 2001

AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows. Insertions are shown underlined while deletions are ~~struck through~~.

1 (currently amended): A laser welding head-controlling system comprising:
a laser irradiating body with a laser inlet and a laser outlet that directs a laser spot at a welding seam,

~~plurala plurality of~~ semiconductor lasers to oscillate ~~plurala plurality of~~ linear laser beams configured to ~~be crisscrossed over a seam line~~ direct said plurality of the linear beams at the laser spot or at a region already welded for measuring a welding state during or after a welding process,

a CCD camera with a band-pass filter therein to pass through only ~~linear laser beams~~ reflected by ~~objects to be welded~~ laser beams from said linear laser beams and to take in, as an image, said welding state ~~by said reflected beams,~~ and

an image processor to process said image ~~of~~ relating to said welding state.

2 (original): A laser welding head comprising a laser welding head-controlling system as defined in claim 1, a laser oscillator to oscillate a laser for welding and a condenser to converge the oscillated laser.

3 (currently amended): A method for controlling a laser welding head comprising the steps of:

irradiating ~~plurala plurality of~~ linear laser beams ~~to a target area of members to be welded so as to be crisscrossed over a seam line~~ onto parts during or after a welding process to ~~measure~~ detect a welding state of the parts,

taking, as an image, said welding state on laser beams reflected by the parts ~~into~~ a CCD camera ~~by means of linear laser beams reflected by said members,~~

processing said image ~~of~~ relating to said welding state, and

controlling a laser welding head based on process data ~~of~~ relating to said image.

4 (original): A method for controlling a laser welding head as defined in claim 3, wherein the laser welding head is controlled by the CAD data of the parts to be welded.

5 (currently amended): A method for controlling a laser welding head as defined in claim 3, further comprising the step of monitoring welding defects of the parts to be welded based on the ~~processed~~ process data and the CAD data.

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6 (currently amended): A method for controlling a laser welding head as defined in claim 4, further comprising the step of monitoring welding defects of the parts to be welded based on the ~~processed~~process data and the CAD data.

7 (currently amended): A laser welding head-controlling system for controlling the position of a laser welding head with respect to ~~ana~~ target area of objects to be welded, comprising:

at least two semiconductor lasers for emitting linear laser beams configured to be crisscrossed over a seam line at a predetermined angle ~~toward~~at the target area or at a region already welded for detecting a welding state during or after a welding process;

a CCD camera provided with a band-pass filter, through which linear laser beams reflected by the objects pass exclusively, to generate an image of the target area; and

an image processor for processing the image of the target area to determine the progress of welding, thereby controlling the position of a laser welding head.

8 (original): The laser welding head-controlling system according to Claim 7, further comprising a CAD data system which stores CAD data of the objects, said data being used to control the position of the laser welding head.

9 (original): A laser welding head comprising the laser welding head-controlling system of Claim 7, a laser oscillator to oscillate a laser for welding, and a condenser to converge the oscillated laser.

10 (currently amended): A method for controlling the position of a laser welding head with respect to a target area of objects to be welded, comprising the steps of:

emitting at least two linear lasers beams so as to be crisscrossed over a seam line at a predetermined angle toward the target area during or after a welding process to detect a welding state of the target area;

generating an image of the target area exclusively from linear laser beams reflected by the objects passing through a band-pass filter, using a CCD camera provided with the band-filter;

processing the image of the target area to determine the progress of welding; and

controlling the position of the laser welding head.

11 (original): The method according to Claim 10, further comprising using CAD data of the objects to control the position of the laser welding head.